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rainfall averaging ten inches during the spring, and fifteen inches during the summer months.

In Alabama and Eastern Mississippi, with a precipitation on the average of fifteen and of twenty inches respectively during the same seasons, the foliage is rich and abundant with large, rounded leaflets, whereas the Texan specimens, from a region with a precipitation similar to that of Florida, during the same periods, approach in their foliage the plants from that section.

In view of these facts, the position I have taken in my remarks made before the Botanical Club of the American Association for the Advancement of Science, at the Washington meeting in 1891, in regard to the specific character of the specimens of *Clematis* from the Eastern Gulf States has to be abandoned.

As worthy of record I would allude to the occurrence of *Quercus heterophylla* in Alabama. This tree, unknown to me, was pointed out by my companion, Mr. Sudworth, in our explorations of the forests of the southern banks of the Tennessee River in Morgan County. In all its characters, the tree presented not the slightest deviation from the forms found on the Atlantic slope. From the abundance of cups scattered below the tree, it is evident that it fruits freely and, as in other localities cited, it is found associated with *Quercus Phellos* and *Q. rubra*. This association, however, cannot be taken as a proof of its being a hybrid; the constancy of its characters under varying conditions of soil and climate, and its fecundity are the strongest proof of its specific value.

Mr. Sudworth has found this tree near Ann Arbor, Michigan, extending thus its geographical range to over about eight degrees of latitude, and spreading from the coast far into the interior.

The Rediscovery of *Juncus Cooperi*.

In the year 1868 Dr. George Engelmann published a description of a new *Juncus* from the southwestern United States, giving it the name *J. Cooperi*.* A single specimen without rootstock or leaves had been collected by Dr. J. G. Cooper in 1861, in the vicinity of Camp Cady, a now abandoned military post situated

*Trans. St. Louis Acad. Sci. ii. 590 (1868.)

about fifteen mileseast of Daggett, San Bernardino County, California. Upon this one specimen all knowledge of the species has rested for thirty years.

The Death Valley Expedition sent out by the U. S. Department of Agriculture entered Death Valley in January, 1891, and camped for several days at Bennett Wells. On the evening of our arrival I walked eastward from camp a few hundred yards to the margin of the salt marsh in the bottom of the valley, and there, amidst the other vegetation peculiar to the densely alkaline moist soil about the salt flat, I found in fruit a *Juncus* evidently related to, but clearly distinct from, both *J. Ræmerianus* and *J. acutus sphærocarpus*. A subsequent examination showed it to be the long lost *J. Cooperi*. It was subsequently found to occur in several places in Death Valley, about the old Eagle Borax Works, on the east side of the valley opposite Bennett Wells, about four miles south of Furnace Creek ranch, near the Coleman Borax Works, two miles east of the same ranch in Furnace Creek Cañon, and at Saratoga Springs. Eastward from Death Valley it was found at several places in Resting Springs Valley, California, and at Ash Meadows, Nevada, points in the watershed of the Amargosa River, and in the Vegas Wash, Nevada, about eight miles from the great bend of the Colorado River. West of Death Valley it was seen only at Hot Springs, Panamint Valley.

At all its stations the plant grows in soil like that described above, and in tufts sometimes composed of only a few stems or occasionally attaining the extraordinary diameter of 2 meters. Upon the new material collected, the following description is based :

Juncus Cooperi, Engelm. Trans. St. Louis Acad. ii. 590 (1868). Plant perennial, densely tufted, 60 to 80 cm. high. Roots large, unbranched and 2 to 3 mm. thick near the base, composed of a slender vascular central thread surrounded by soft parenchyma tissue and an epidermis; rootstocks short, closely branched; stems erect, rigid, terete or slightly compressed, striate, leafless between the inflorescence and the base; lower sheaths light brown, shining, bladeless, but with a filiform-aristate appendage about 10 mm. long; upper 1 to 4 sheaths stramineous to light green, bearing a stiffly erect spine-pointed terete leaf exactly resembling the stem; inflorescence paniculate, its lower leaves erect, exceeding the panicle, about 10 cm. or less in length, otherwise like the root-leaves; branches of the panicle erect or nearly so, 8 cm.

long or much shorter, mostly unbranched, terminated by a 4-to 10-flowered glomerule; flowers borne singly in the axils of white scarious cuspidate bracts, the very short pedicel similarly bi-bracteate; sepals 5 to 6 mm. long, oblong-lanceolate, cuspidate, coriaceous, shining, plainly but not prominently few-nerved, scarious-margined; inner sepals shorter, barely cuspidate; stamens 6, nearly equalling the inner sepals, anthers when moist about 2.5 mm. long by 1 mm. wide; ovary oblong, equalling the included style; stigmas 2 to 2.5 mm. long; capsule narrowly oblong, acute, 3-sided, exceeding the sepals by 1 mm. or less, rigid-coriaceous, 3-celled, valves spreading but slightly in dehiscence; seeds closely packed and misshapen, with a conspicuous raphe and short tails, body about 1 mm. long, oblong, reticulate, the areas themselves smooth or faintly reticulate, not lineolate.

This rush is most nearly related to Engelmann's *Juncus acutus sphaerocarpus* (*J. robustus*, Wats.) and, less closely, to *J. Ræmerianus*. It agrees with both in its stiff, erect, stem-like, pointed leaves, pseudo-lateral inflorescence, and glomerate flowers; and differs from both in its simpler inflorescence and much larger flowers and fruit, from the former in its cuspidate sepals and narrower capsule, and from the latter in its rigid coriaceous sepals.

Since making the observations on the Death Valley specimens, I have found in the National Herbarium, under the name *J. compressus*, a specimen of *J. Cooperi*, collected by C. R. Orcutt, in 1868, at Borrego Springs, Colorado Desert, California. It is probable, therefore, that the species will be found more widely distributed in the deserts of southeastern California. Mr. S. B. Parish informs me that he has looked carefully for the plant at Camp Cady, its type locality, but has failed to find it. Dr. Cooper undoubtedly found the plant farther out in the desert than has been supposed, in some alkaline marsh.

FREDERICK VERNON COVILLE.

Botanical Notes.

Aster undulatus, L. One of the ligulate florets from a plant of this species was found to have three well-developed style-branches. The branches were all alike and also like the style-branches of other ligulate florets. The stigmatic papillæ were along their margins [as shown in I. 2 is the normal style of the ligulate floret and its branches].